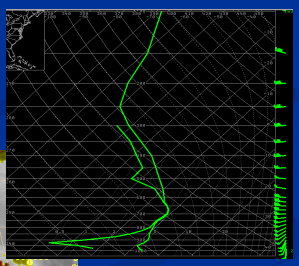
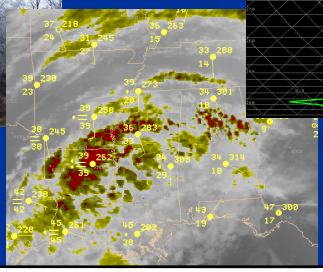
Jan 8th Ice Event – A Brief Overview

Chris Darden





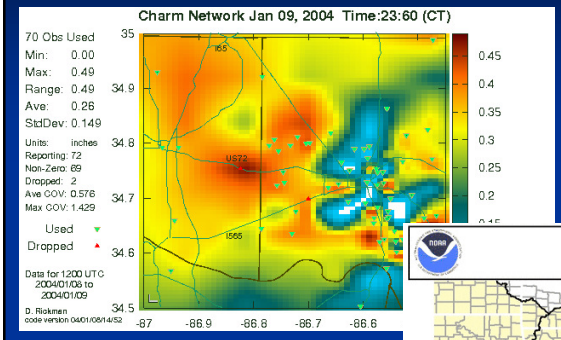
What Happened?

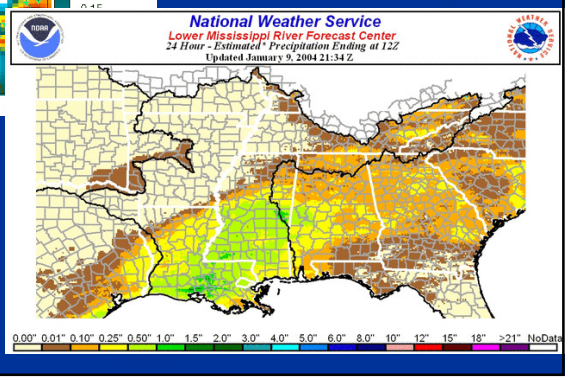
- Light precipitation overspread the area during the daylight hours on the 8th.
- Most of the precipitation fell in the form of rain.
- However, some sleet and pockets of freezing rain were also reported.
- Significant icing occurred in the higher elevations of northeast AL and southern TN

Icing in the Higher Elevations

Photos courtesy of
Daniel Lamb

Precipitation Amounts





Precip amounts averaged around ¼ inch with higher amounts east of I-65

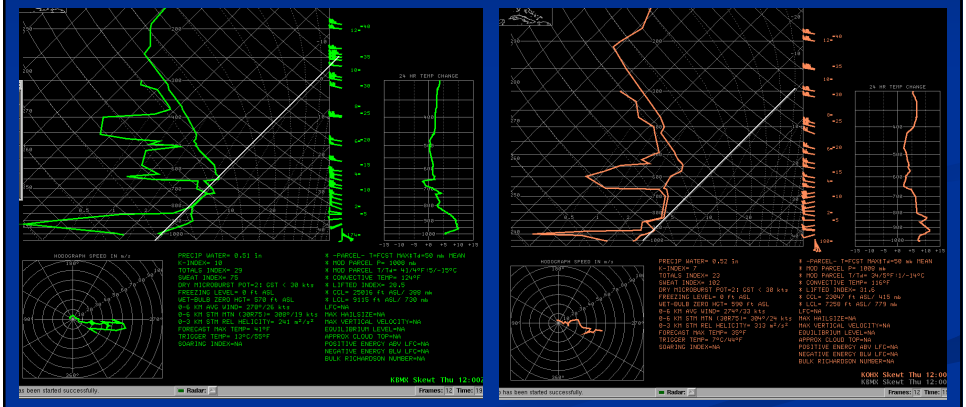
Synoptic Overview

- Upper level trough diving southeast out of the plains toward the mid mississippi valley.
- Surface low across northeast TX with inverted trough extending northward.
- Gulf moisture return, coupled with large scale ascent (omega, Q-vector convergence) led to the expansion of mainly light precipitation during the day.

Raob Data

12z Upper Air Plots BMX (left) and OHX (right)

White line denotes 0 C Isotherm

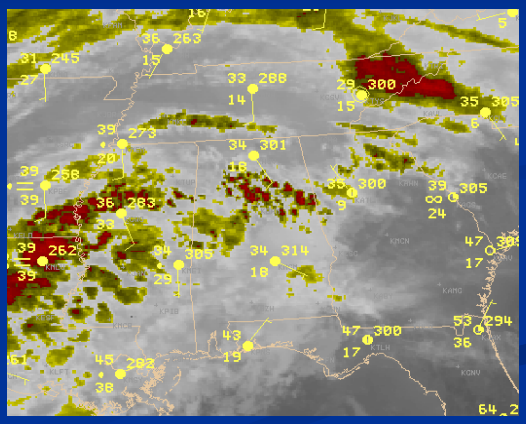


Note very dry subcloud layer (below 850 mb) resulting in low surface wet bulb temperatures.

Surface and IR Imagery

1600 UTC

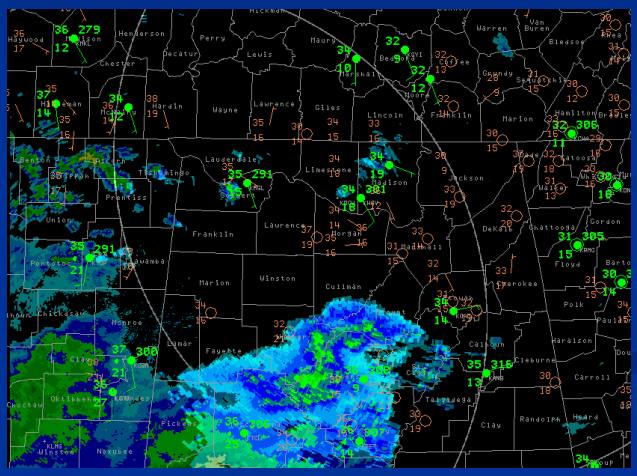
- Subtle baroclinic leaf structure in IR imagery
- Light to moderate precipitation to our west and southwest
- Cellular cloud top enhancement
- Cool, dry air in place ahead of precipitation



Radar Imagery

1600 UTC

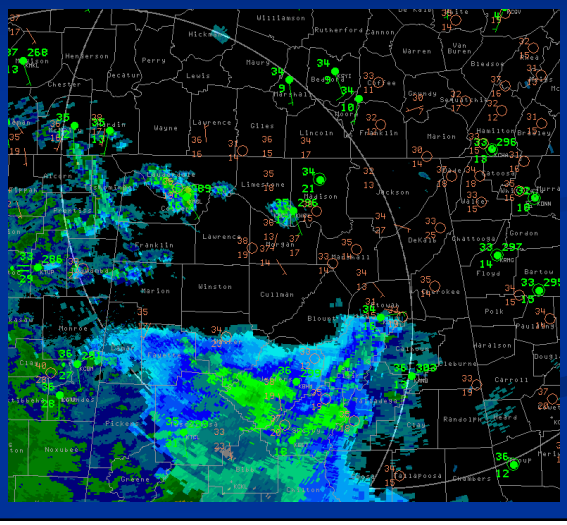
- Precip starting to advance eastward toward the region
- Surface wet bulb temperatures still very low
- Spotter reports indicate sleet near Tuscaloosa at this time



Radar Imagery

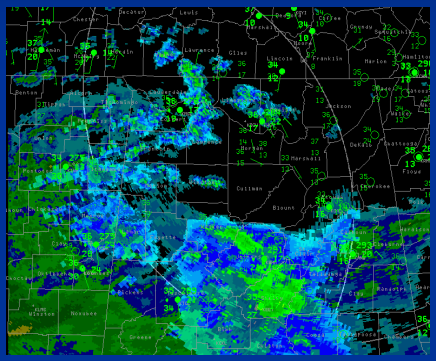
1700 UTC

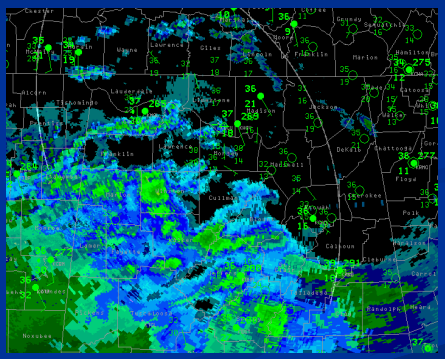
- Rain/sleet mix being reported near Florence
- Sleet also reported at HSV
- Surface dewpoints still in the teens with wet bulbs below freezing



Radar Imagery

1800 UTC (left) and 1900 UTC (right)





Precip continued to slowly advance into the area.
Rain/sleet mix being reported in many locations.

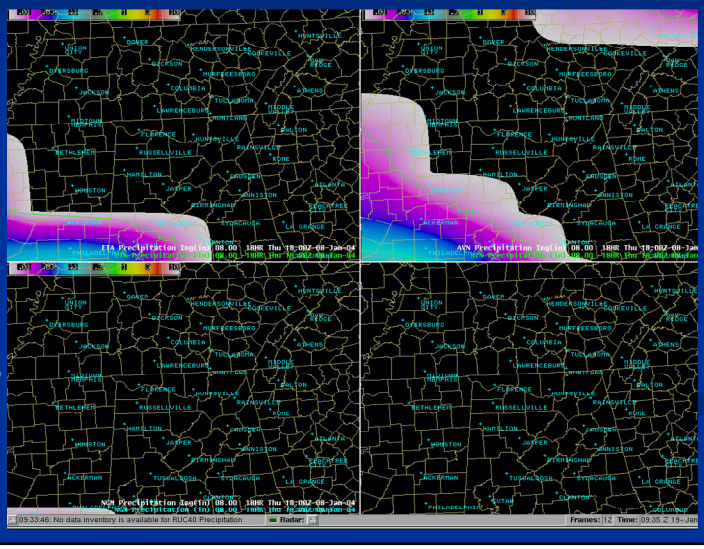
Some Model Notes

- A day or two in advance of the system, the GFS was colder in the low levels than the Eta.
- The Eta indicated mainly rain while the GFS indicated more of a mix.
- As the event neared, the Eta slowly came in line with the cooler GFS
- However, both models were slow with the QPF
- MOS Guidance values were way too warm on maximum temps for the 8th

Models Too Slow With QPF

Model QPF from 00Z/08 Cycle

- 3 Panel precip prog for 12z-18z on the 8th
- 00z/08 model cycle showed no measurable precip through 18Z
- Onset of precip was 6-9 hours too slow
- The quicker onset of precip affected surface temperatures and precip type



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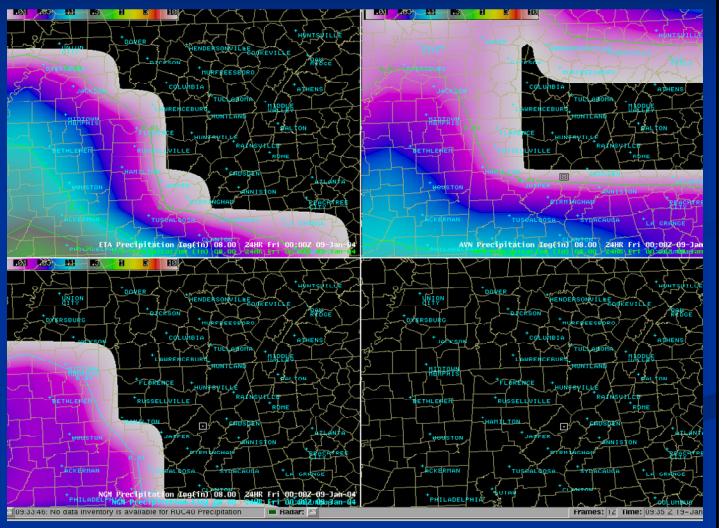
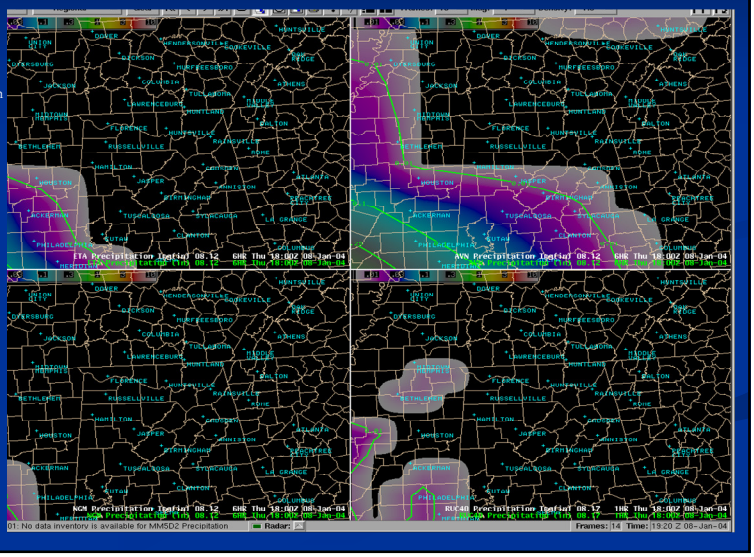


Models Too Slow With QPF

Model QPF from 12Z/08 Cycle

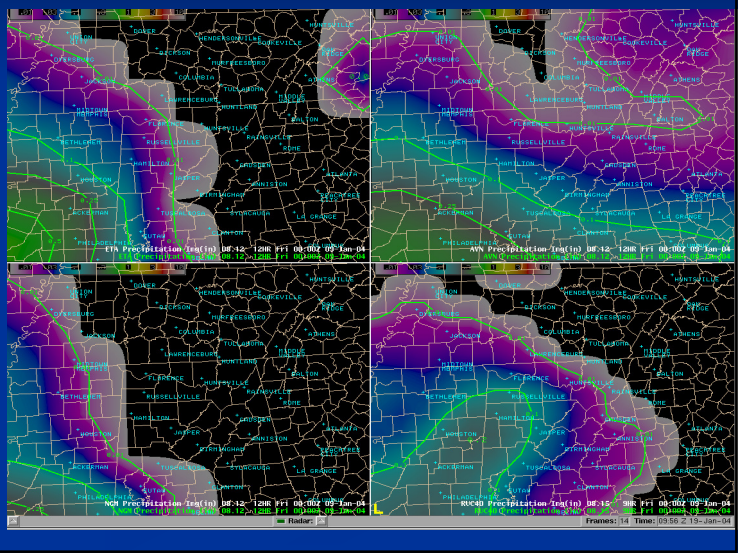
- 4 Panel precip prog for 12z-18z on the 8th
- 12z/08 cycle began to pick up on a faster evolution of precip
- GFS verified the best, but even it was still too slow
- WAA/Isentropic induced precip often begins quicker than the models might indicate



Models Too Slow With QPF

Model QPF from 12Z/08 Cycle

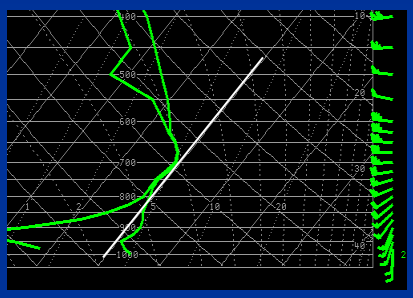
- 4 Panel precip prog for 18z-00z on the 8th
- 12z/08 cycle began to pick up on a faster evolution of precip
- Eta/NGM still too slow with precip
- Observed precip amounts by 00z
  - 3A1 – 0.07”
  - DCU – 0.03”
  - HSV – 0.04”
  - MSL – 0.05”

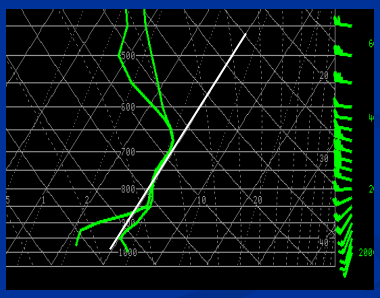


MesoEta Bufr Soundings

KHUN 18 UTC (left) and 21 UTC (right)

White line denotes 0 C Isotherm





MesoEta soundings show slow saturation of surface to 850 mb layer. Even at 21 UTC (right)…surface wet bulb temperature quite cold.

Event Summary

- Once precipitation began, temperatures in most locations cooled to around freezing.
- Temperatures in the higher terrain dipped below freezing (28-31 degrees).
- Some light to moderate icing was observed atop Monte Sano, Green Mtn, Lookout Mtn, and the Cumberland Plateau
- Schools in Franklin County TN closed due to icing in Sewanee.
- No significant problems were reported in the lower elevations.

Monte Sano Pictures

Photos courtesy of Daniel Lamb

Icing line atop Monte Sano

Bankhead Parkway

Office Performance

- First mention of winter precip type (snow) was in the 5 am HWO issuance on the 6th
- First mention of mixed precip (snow and fzra) in the 1 pm issuance on the 7th
- HWO updated at 851 pm on the 7th to emphasize fzra in the higher terrain
- Additional emphasis on fzra added on 5 am HWO issuance on the 8th

Office Performance

- 5 am HWO Issuance (on the 8th)
  - "Chances of a wintry mix will increase toward the higher elevations of northeast alabama and southern middle tennessee…Temperature profiles of the atmosphere are borderline between liquid and frozen precipitation."
- 5 am SPS (on the 8th)
  - "…the air may cool to near freezing as rain starts to fall. As a result…rain may begin to mix with sleet this afternoon…"

Office Performance

- Based on diagnostic and model trends, a WSW was issued at 1106 AM (on the 8th) for the eastern half of the CWA (for the aftn and night periods)
  - "temperatures across the advisory area are currently hovering near the freezing mark. Light precipitation will begin to affect the region by late afternoon and will become more widespread after sunset….the main concerns for freezing rain will be cooler ridgetops along with sheltered valley locations…"

Office Performance

- At 4 pm, the WSW was updated to include Madison and Morgan counties.
  - "At this time…it appears that the precipitation will fall primarily in the form of sleet and rain. However…freezing rain will also be a concern with temperatures dipping to around freezing in some locations…The main concerns for freezing rain will be along the cooler ridgetops…in sheltered valley locations and elevated road surfaces."

Office Performance

- WSW updated at 853 PM
  - "…freezing rain and freezing drizzle will be the primary weather maker across the higher elevations. We have received several icing reports on Cumberland Mountain…Sand Mountain…Lookout Mountain…Rainsville and Arab."
- SPS's were issued every one to two hours during the evening hours to highlight the ongoing event.

Observations

- Models soundings from the 12 UTC and 18 UTC runs on the 7th began to trend toward a rain/freezing rain scenario.
  - We continued to advertise rain possibly mixed with or changing to snow.
- High temperature forecasts were too warm for Thursday
  - Due to faster moisture return and low level evaporative cooling, temperatures struggled to rise through the 30s.

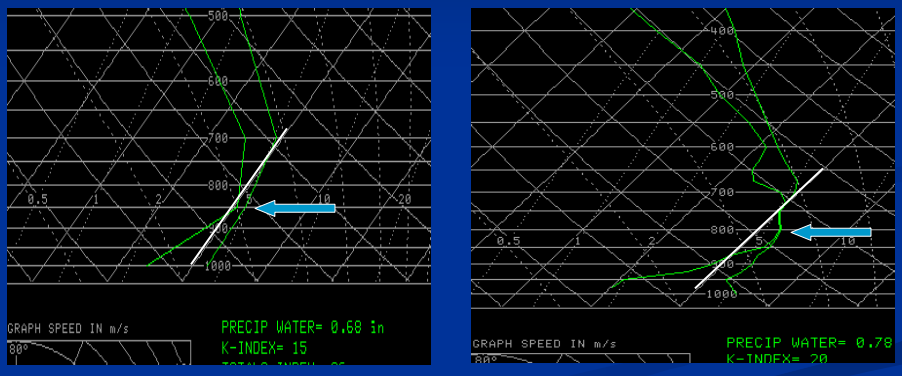
Sounding Review

- Model sounding progs from the 12z/07 cycle indicated a mainly rain/freezing rain scenario for the 8th.
- Elevate warm layer values (based on model soundings) were between 2 and 4 degrees.
- Using the Baumgardt microphysics review, this would indicate primarily a rain/freezing rain scenario with a small possibility of sleet.

Sounding Review

Valid 00z on Friday January 9th - 12z/07 GFS (left) and 12z/07 Eta (right)

White line denotes 0 C Isotherm



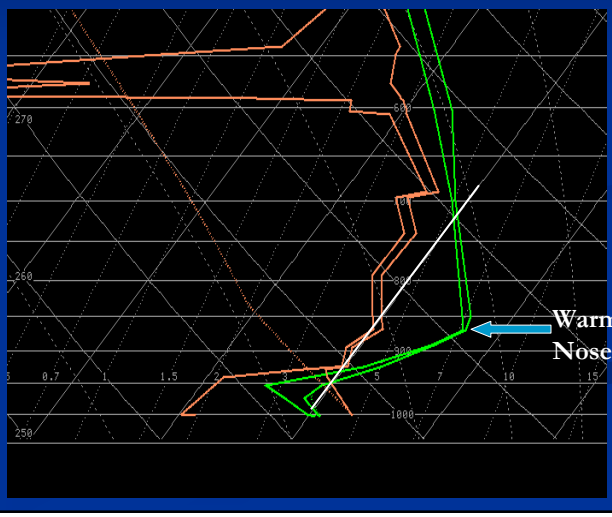
Note significant warm layer above 900 mb. This would indicate that snow is unlikely even with evaporative cooling.

Observed Soundings

00z Fri Jan. 09th – KOHX (brown) and KBMX (green)

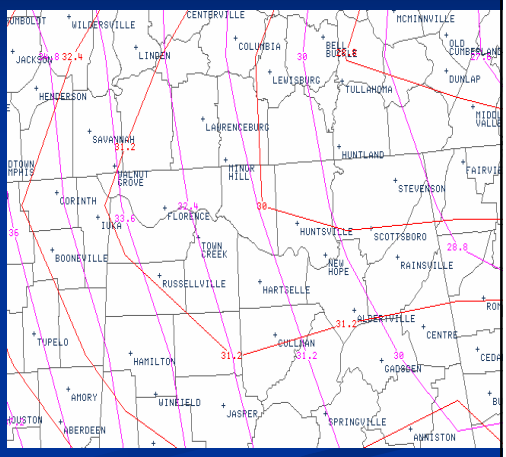
White line denotes 0 C Isotherm

- OHX Sounding mostly below freezing.
- Significant warm nose analyzed at BMX (> 7C)
- Initialized model soundings for 00z/09 not available for review



Wet Bulb Temperatures

- The 12z/07 cycles of the Eta/GFS showed very low surface wet bulb forecasts for the TN Valley Thursday afternoon.
- If you factor this with precipitation timing and surface dewpoints, this might key you into a significant evaporative cooling event. Thus, expected WAA would be offset and temperatures would struggle to rise.
- Initial precipitation was observed with 15-20 degree dewpoint depressions.
- In these situations, MOS guidance values can be way too warm.



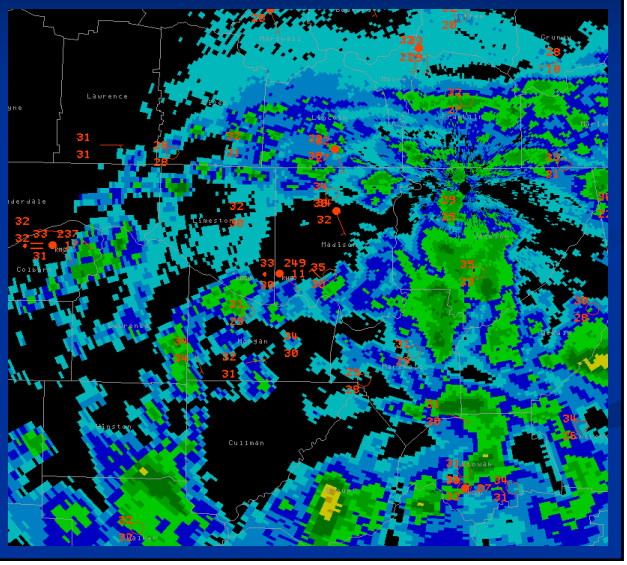
Surface Wet Bulb Temp Forecast for 00z Fri Jan 9th

from the GFS (purple) and Eta (red)

Surface Obs/Radar

00z Friday January 9th

- Airmass nearly saturated with surface temperatures ranging from 29 to 34 degrees.
- Surface wet bulb temp forecasts (previous slide) verified fairly well.
- Observations reporting rain with some freezing rain (per sfc temps and spotter reports)



Suggestions

- Review the Baumgardt "Top Down" approach and microphysics information when winter weather is anticipated.
- Utilize the high resolution BUFR data and BUFKIT software to analyze sounding data.
- Be alert for the potential for evaporative cooling and its impact upon temperatures and precipitation type.
- In cases where evaporative cooling appears to be significant, model surface wet bulb temps may be quite useful.
- In isentropic upglide and warm air advection situations, precipitation may begin several hours ahead of model projections.